

# viti-notes

[understanding  
grapevine growth]



Research *to* Practice

## Spring shoot growth

### Viti-note Summary:

- Shoot growth in the first month after budburst
- Energy supply in the early stages of growth
- Nutrient demand as growth progresses
- Changing water requirements
- 'Later' spring shoot growth
- Stored versus soil nutrients
- Formation of new buds on developing shoots

### Other topics in this Viti-Notes series include:

- Bud dormancy and budburst
- *Spring shoot growth*
- Flowering and pollination
- Berry development - up to veraison
- Berry development - Ripening
- Defining berry ripeness
- Site factors influencing berry ripening processes and rates of ripening
- Restricted Spring Growth syndrome



Figure 1. Early stages of shoot development in spring. (Photo courtesy of AWRI image collection)

### Shoot growth in the first month after budburst

After budburst in spring, initial shoot growth—up to the time at which the first 12 leaves have separated—is slow.

### Energy supply in the early stages of growth

Each vine leaf has an active photosynthetic life of about three months. They perform at their maximum capacity about midway through this period, after which they decrease their contribution to the vine's total assimilate production.

Once vines start growing in the spring, the starches and minerals stored last season in the woody portions of the vine are used for the early growth processes. This situation prevails until the new shoots become self-sufficient, i.e. adequate leaf area has been produced.

Most of the vine's energy production is directed to shoot growth until flowering commences. In young, non-bearing vines,

a significant proportion of this energy goes towards trunk growth.

### Nutrient demand as growth progresses

As the level of photosynthesis increases, so too does the vine's requirement for nitrogen (N), phosphorus and other elements. N is mobilised from storage in roots and the woody parts of the vine, but early in the season some roots also actively take up nitrogen from the soil. N fertiliser applied between harvest and leaf fall in the previous season are mainly used for current season's early growth (so long as it was taken up in autumn).

### Changing water requirements

Vines have a relatively low water demand early in the season. However, if the soil is too dry, either due to under-irrigation or drought, stressed vines will use even less water. This can limit shoot growth and important physiological functions. Equally, poorly-timed deficit irrigation

applied too early in the season can impact on nitrogen uptake and photosynthesis and thereby impair vine functions, including bud development and flowering processes. This may have implications for both the current season and the next.

## 'Later' spring shoot growth

The relatively slow early growth period is followed by a massive spurt of growth of shoots and leaves later in spring. Often termed the 'grand period of growth', it is during this time that lateral shoots may form, adding to the general leafiness of the vine. Shoot growth is greatest just before flowering, after which it declines as the vine begins to direct its energies towards fruit production.

## Stored versus soil nutrients

During this rapid phase of shoot growth, the vine has its greatest requirement for minerals. Early in the season, minerals were moved from storage in the roots and other permanent woody structures to support shoot growth. Now vines begin to draw on the soil resource for their mineral supplies; however, if the soil supply is lacking, mobilisation of the vine's own stored mineral reserves will continue. This might result in exhaustion of that supply, or the vine's metabolic transport mechanisms might become inefficient, at which point symptoms of deficiency occur. If a mineral deficiency is corrected by additives, the vine needs to take up sufficient mineral to support its current physiological activities before it can begin to store against further deficiency.

## Formation of new buds on developing shoots

As shoots develop, buds form where each leaf stalk (petiole) joins the shoot. There are two types of buds:

- The so-called 'prompt' bud, which develops into the lateral shoot in the same season in which it is formed;
- The 'latent' buds which usually remain dormant until the following spring. The primary latent bud (PLB) and the two accessory buds are collectively known as the 'compound bud'. It is usually the PLB which will develop into the next season's shoot.

Heavy shading of the developing buds and their subtending leaves on the current season shoots will reduce bud fruitfulness and thus inflorescence number in the following season. Those developing buds which are most exposed to sunlight at critical development stages have the greatest potential for high fruitfulness. Bud fruitfulness is also reduced by low temperatures, persistent water stress and poor vine nutrition.

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## Further information

### Useful references:

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